

REMARKS

Claims 1-16, all the claims pending in the application, stand rejected. Claims 1, 2, 4, 5, 9, 10, 12 and 13 are amended. New claims 17-20 are added.

Support for the added limitations to the intermediate area and the new claims may be found at page 8, line 11 to page 11, line 3. In addition, new Claim 18 is based upon the content of original claims 9 and 12, and the disclosure at pages 10 and 11

Claim Rejections - 35 USC § 103

Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over MORIYA et al. (US 2003/0031890) in view of NOZAWA et al. (US 2002/0061452). This rejection is traversed for at least the following reasons.

The Examiner looks to MORIYA for the limitations in claims 1 and 9, but admits that MORIYA does not explicitly teach the limitations directed to a maximum height between -1. and 0 gm from a reference substrate or the limitations of claims 2-4, 8, 10-12 and 16 directed to the formation of a thin film on the main surface of a reticle substrate. The Examiner looks to NOZAWA for a teaching at [0046] for preparing a half-tone phase shift mask blank where a "flatness change," meaning a difference in flatness of a transparent substrate before film formation and after film formation, is small and where "flatness," representing a difference in height from a reference plane between the highest point and the lowest point of a substrate in a flatness quality area, is controlled. The Examiner also looks to NOZAWA at [0044] for a teaching that a substrate, having formed thereon a translucent film, can be subject to a heat treatment to reduce the internal stress to a range acceptable for use as a phase shift mask blank.

The Invention

The invention, as now defined in amended or new claims 1 to 20, may be understood with reference to Fig. 3. In Fig. 3 of the present application, the substrate has an end shape composed of a *flatness measuring area* on the main surface 2, a chamfered surface 4, and an intermediate area which is placed between the *flatness measuring area* and the chamfered surface 4 and which has a width of 3 mm inwardly from a boundary 14 between the chamfered surface 4 and a main surface 2.

Moreover, it is to be noted in Fig. 3 that the intermediate area may be called a “*flatness non-measuring area*” and is gradually inclined or declined from the *flatness measuring area* towards the chamfered surface 4. As a result, the end shape of the substrate according to the present invention is formed by two inclined lines shown in Fig. 3 by an intermediate area (*flatness non-measuring area*) that can be a part of the main surface 2 and the chamfered surface 4. In addition, a “reference plane” is defined in consideration of the *flatness measuring area* located within the intermediate area and a declined degree at the intermediate area is determined relative to the reference plane. This feature is now recited in the amended claims.

Thus, the substrate according to the present invention is featured not only by (1) the flatness of the *flatness measuring area* but also by (2) the degree of decline at the intermediate area (*flatness non-measuring area*) relative to the reference plane. Given these features, the substrate of the above-mentioned structure can be easily mounted without any deformation onto various different substrate holders used in steppers.

MORIYA

On the other hand, with reference to Fig. 4, MORIYA et al discloses a square substrate 1 which is fully flat in its peripheral region. Specifically, the square or angular substrate 1 has a flatness of up to 0.5 μm in an outside region of the substrate that extends from a position spaced 3 mm inward from the peripheral end face to the inner boundary of a tapered edge position (column 0013). To this end, Moriya et al reference defines, on the substrate, a position A spaced about 3m inward from the peripheral end face 5 and the tapered edge portion 4 of a width W. The outside region B is defined between the position A and the inner boundary 4a of the tapered edge portion 4.

No Inclined Intermediate Region

Clearly, Moriya et al reference is focused only on the flatness of the outside region B between the position A and the tapered edge portion 4. MORIYA is not concerned with, nor does MORIYA disclose in an inclination of the area outside of region B. As a result, there is no express disclosure, and no suggestion at all in MORIYA about an intermediate area which might have an inclination between the position A and the tapered edge portion 4 and which may be

included in the outside region B. The outside region B is not declined or inclined in MORIYA et al relative to a main surface C of the substrate 1. Therefore, an end shape of MORIYA et al is specified only by a single inclined line of the tapered edge portion 4. Further in this regard, neither a reference plane nor a reference line from a flatness measuring area is defined or recognized in MORIYA et al.

Only Invention Overcomes Problems

Because there is no inclined intermediate area in MORIYA, the end shape of the substrate may include a ski-jump type that is of great concern when manufacturing the substrate. This problem is avoided by the present invention, as discussed on page 9, lines 16 to 20 of the present specification, because it includes an inclined intermediate area.

NOZAWA

NOZAWA et al discloses a half-tone phase shift mask blank which has a translucent film specified by a center-line surface roughness (Ra) of 0.3 nm or smaller. In addition, the translucent film is preferably deformed into a convex shape so as to precisely measure a compressive stress of the translucent film. Contrary to the Examiner's suggestion, this shows that the translucent film is not effective in reducing the internal stress. To the extent that the Examiner maintains his position, a detailed technical explanation is respectfully requested so that the fundamental theory and science be challenged in a Declaration, if necessary. Finally, NOZAWA does not teach or suggest a modification of MORIYA et al to add an intermediate area that is inclined, as now claimed.

Conclusion

Applicants now have defined the invention with structural features, particularly an intermediate area with an inclination, that are not taught in the prior art and that provide significant advantages in the manufacturing process. Moreover, these features are not suggested, nor would there be any motivation to seek them, as the prior art clearly teaches toward a structure having only a flat main surface, a chamfered surface and a side surface.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. § 1.111
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The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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